REMARKS

Applicants thank the Examiner for taking the time to discuss this case by telephone on July 30, 2004.

Applicants acknowledge that the Examiner has found allowable subject matter in claims 8, 9, 41, and 43-48. The status of claim 48 is unclear since it has been both allowed and rejected under 35 U.S.C. § 112. Applicants request clarification.

Claims 1-21 and 41-49 were pending before this amendment. Claims 42 and 49 are cancelled, and claim 1 is amended herewith. Support for amendment to claim 1 is found, for example, on page 2, lines 27 and 28 of the specification. This amendment therefore adds no new matter. Applicants believe that all claims are now in condition for allowance.

The Invention

As amended, claim 1 features a method for removing a virus from a liquid sample. The method includes obtaining a membrane engrafted with polymeric side chains. Each side chain has one or more positively charged functional groups that interact with viruses. The polymeric side chains each have one functional group per repeat unit. Each functional group consists of a single secondary, tertiary, or quaternary amine, and has a single positive charge at physiological pH. The membrane has a nominal pore size between 20 nm and 1000 nm. The sample is passed through the membrane to remove viruses from the sample.

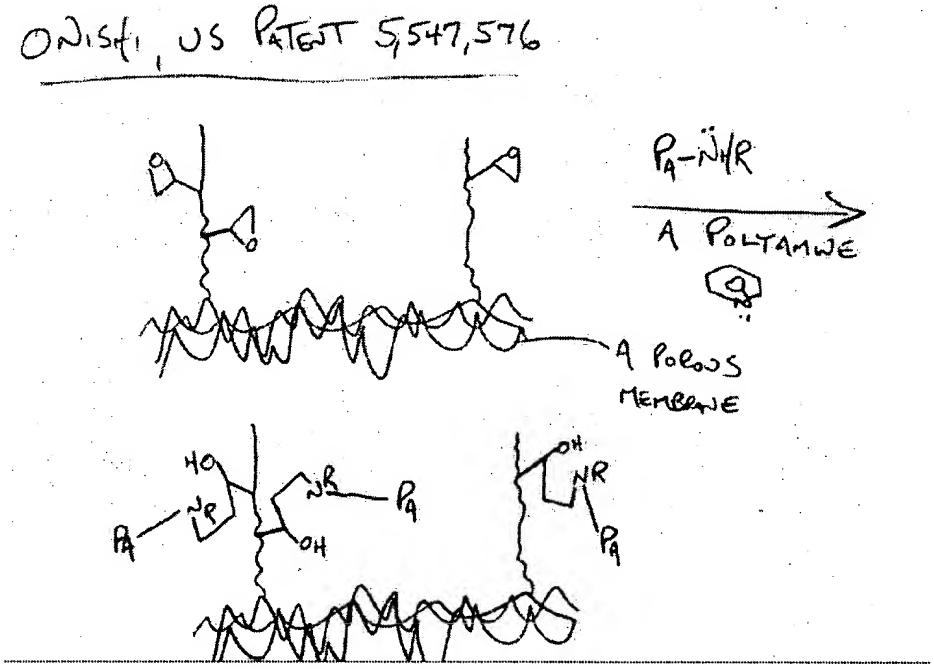
35 U.S.C. § 112, Second Paragraph

Claims 48 and 49 have been rejected for allegedly being indefinite. Applicants are confused since claim 48 has been both allowed and rejected. Clarification is requested. Claim 49 has been cancelled to obviate this rejection.

35 U.S.C. § 102 (b)

Claims 1-3, 10-14, 18-20 have been rejected as being allegedly anticipated by Onishi, U.S. Patent No. 5,547,576. Applicants traverse this rejection for the following reasons.

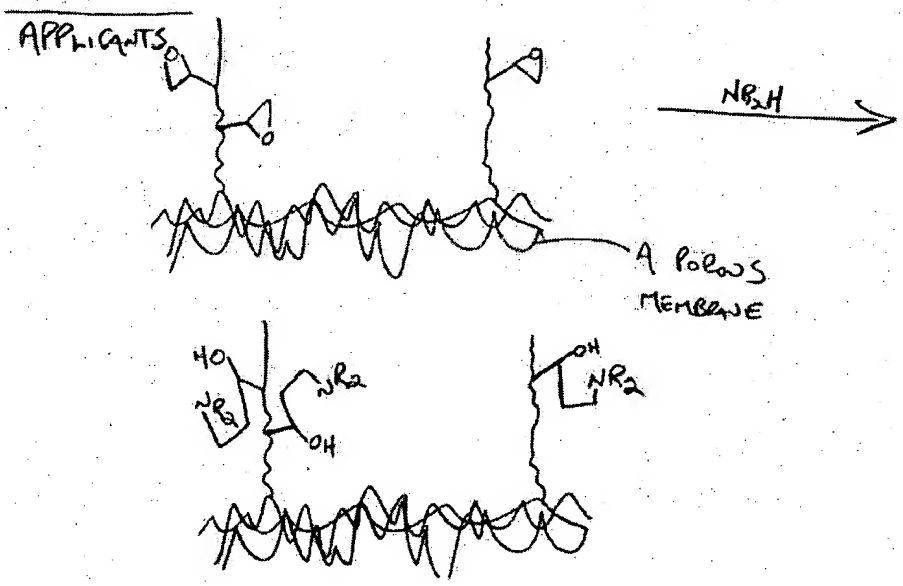
Generally, Onishi discloses a material that can selectively remove pathogenic substances containing leukocytes, platelets, and virus from a protein-containing solution. The device includes a base material (e.g., a filter). During its manufacture, the filter includes a polymer with latent reactive functionality (e.g., epoxy groups) grafted onto the base material, and a polyamine, grafted onto the polymer with latent functionality (e.g., by nucleophilic ring opening addition to form a covalent bond). We have schematically illustrated Onishi's filter membrane below.



Onishi uses the word polyamine over thirty-five times in the specification. As concrete examples of polyamines, Onishi discloses, at column 6, lines 58-64, "a polymer having ethyleneimine, propyleneimine, butyleneimine or N-hydroxyethyl ethyleneimine, N-aminoethyl ethyleneimine as a monomer unit, a polymer such as polyethyleneimine or polypropyleneimine, mutual copolymer of the above monomers or a copolymer with other copolymeric monomer may be given" (emphasis added).

In contrast, claim 1, as amended, features functional groups consisting of a single secondary, tertiary, or quaternary amine. This is in contrast with Onishi's polyamines. Claim 1

now excludes polyamines. Onishi does not disclose functional groups consisting of a single secondary, tertiary, or quaternary amine. Applicants' invention can be schematically illustrated by the sketch below, specifically shown using glycidyl methacrylate and a monomeric, secondary amine, producing a functional group that consists of a single tertiary amine:



Again, Onishi does not disclose functional groups consisting of a single secondary, tertiary, or quaternary amine. As a result, Onishi cannot anticipate claim 1, and all rejected claims that depend therefrom.

35 U.S.C. § 103 (a)

Claim 4-7, 15-17, 21, and 42 have been rejected as being allegedly unpatentable over Onishi.

It should be pointed out that the Office Action of August 5, 2003 incorrectly states, "reaction with diethylamine is also disclosed (column 5, lines 36-43, and column 6, lines 58-64)." Applicants respectfully submit that Onishi does not disclose diethylamine. In fact, at column 5, lines 36-43, Onishi discloses "among polyamine compounds, polyethyleneimine is an

optimal material...." As the Examiner is no doubt aware, an imine is not the same thing as an amine, and polyethyleneimine is not the same thing as diethylamine. In addition, at column 6, lines 58-64, Onishi discloses only polyamines. Even though Onishi states that the sum of amino groups can be smaller than 3, he still requires a polyamine, and thus does not recite applicants' claimed single amine. Thus, Onishi fails to describe the use of diethylamine.

Onishi describes the need for a polyamine, and one skilled in the art, after reading Onishi, would take away from Onishi that a polyamine is desirable and needed to remove viruses or platelets from a protein-containing solution. Onishi also describes that the molecular weight of the polyamine should be optimized to enhance the efficiency of the removal of the pathogenic substances. Applicants believe that Onishi teaches away from the applicants' invention, and applicants' results are unexpected, and therefore not obvious in view of Onishi. For at least these reasons, claims 4-7, 15-17, 21, and 42 are patentable over Onishi, and applicants respectfully request withdrawal of the 35 U.S.C. § 103 (a) rejection.

In response to the Examiners statement of the reasons for allowance of claims 43-48, applicants agree with the Examiner, for at least those reasons cited by the Examiner.

Enclosed is a $210 check for the Petition for Extension of Time fee. Apply any other charges or credits to deposit account 06-1050, referencing Attorney Docket No. 00786-429001.

Respectfully submitted,

Date: August 2, 2004

J. Peter Fasse
Reg. No. 32,983

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110-2804
Telephone: (617) 542-5070
Facsimile: (617) 542-8906